think of the highly trained men of science who were killed at Gallipoli or drowned in the mud of Flanders while Ministers turned for advice to alchemists and circle-squarers, or confused great chemists with dispensers of drugs, and we wonder whether even now anyone in power realises what civilisation has lost through the sacrifice of creators of knowledge. While we mourn their loss, let us work and pray for the scientific enlightenment of the leaders into whose hands the destinies of the nation are entrusted, so that we may be assured of strong and effective guidance whatever is before us.

The Newer Spiritualism.

Phenomena of Materialisation: A Contribution to the Investigation of Mediumistic Teleplastics. By Baron von Schrenck-Notzing. Translated by Dr. E. E. Fournier d'Albe. Pp. xii + 340. (London: Kegan Paul, Trench, Trubner, and Co., Ltd.; New York: E. P. Dutton and Co., 1920.) Price 35*s.* net.

"OF making many books" on spiritualism "there is no end," and study thereof "is a weariness of the flesh." Certainly such is the effect of reading a ponderous and repellent volume of 200,000 words conveying the story of séances the details of which are as like one another as peas in a pod. The author describes it as "really a monograph on materialisations," since it deals, in the main, not so much with communications from the dead as with exudations from the living. These, in pseudo-scientific jargon, are defined as "ideoplastic" or "teleplastic," taking the shape of fluidic threads or psychic discharges from the mouth, armpits, and other parts of the body, sometimes returning thereto, and often accompanied by blood. Both the author and translator agree in assigning them to "a new, or, rather, a hitherto unexplored, function of certain human organisms" which have "a spiritistic interpretation" as "conductors of psychic impulses."

The book made a considerable stir in Germany on its publication in 1913; here, it was the subject of a damaging review by Miss Verrall in the Proceedings of the Society for Psychical Research, July, 1914. The translation before us was made by Dr. Fournier d'Albe in consultation with Mme. Bisson, in whose house the medium lived, and whose reports on the sittings make up the substance of the book. It is to her that the medium has "lent her remarkable powers" in return for board and residence. The real name of the medium, whose pseudonym is "Eva C.," is said to be Marthe Béraud; and while Baron von Schrenck-Notzing says that he "is not justified in publishing details concerning her personal and family affairs," he withholds nothing in respect of detail about herself, both physically and mentally. As to the latter, she is described as abnormally emotional, subject to violent outbursts of anger, very amenable to influences, and nursing illusions that her charms lead the male sex easy captives. The numerous photographs of her which are sandwiched between faked spirit photographs show that physical beauty forms no part of her attractiveness. She is, in brief, a confirmed erotic and neurotic woman, who, according to information from an independent source, nurses the belief that she is an incarnation of Thaïs.

As already said, the record of the sittings, which extended from June, 1909, to July, 1913 (they were held chiefly in Paris), has a dreary uniformity. Mme. Bisson was always present; her watchful care over "Eva C." suggests more than friendship, and awakens suspicions as to collaboration in "materialisations." The appointments were as usual; the medium sat in a dark cabinet, Mme. Bisson hopping in and out, and then joining the other sitters, rarely more than three or four, in a room dimly lighted by a red lamp; a white light, as all spiritualists agree, "acting destructively on the pseudopods or psychic projections from the medium's body." Apart from M. Richet, a somewhat credulous savant, no prominent man of science was at the sittings, save one Dr. Specht, who, after three attendances, said that he had been "shown materialisations which do not exist." Baron von Schrenck-Notzing naïvely adds: "On account of this negative attitude, Dr. Specht was not invited to further sittings." Difficulty met attempts to secure teleplasma; "Eva C." was backed by Mme. Bisson in her objections, but of the two samples which Baron von Schrenck-Notzing secured one was recognisable as human skin, and the other, under microscopic examination, a mucus-like substance, showed "cell detritis, numerous microbes, and some wool (from dress)." Convinced as he is that the teleplasmic phenomena have a "spiritual interpretation," it is to the credit of Baron von Schrenck-Notzing that he admits explanations, if only to controvert them, such as are supplied by the facts of hysterical rumination, when the patients bring up matter which they have swallowed, and of excretions due to excitation.

The reviewer can deal only with such statements as fill this book at their face value. The *onus probandi* lies on those who make them. As Faraday said in a lecture delivered before the

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Royal Institution in 1854: "I am not bound to explain how a table tilts any more than to indicate how, under the conjurer's hands, a pudding appears in a hat." Baron von Schrenck-Notzing and Dr. Fournier d'Albe have a clear course before them. Let them bring "Eva C." to London to exhibit her "materialisations" before a committee of which Sir Ray Lankester, Sir Bryan Donkin, and Mr. Nevil Maskelyne should be members. Then the matter would be put beyond doubt whether the so-called evidence, thus judicially sifted, is or is not based upon the collusive action of mediums and upon the bad, because prejudiced, observation of the sitters. The need to keep in mind what Hume says about occult phenomena was never more urgent than it is to-day. "As finite added to finite never approaches a hair's breadth nearer to infinite, so a fact [statement?] incredible in itself acquires not the smallest accession of probability by the accumulation of testimony."

Boltzmann's Lectures.

Ludwig Boltzmanns Vorlesungen über die Prinzipe der Mechanik. Dritter Teil. Elastizitätstheorie und Hydromechanik. Edited by Prof. Hugo Buchholz. Pp. xiii+608-820. (Leipzig: Johann Ambrosius Barth, 1920.) Price 21.60 marks.

THE name of Ludwig Boltzmann will live on account of his great creative work, the study of which has happily been facilitated by the publication of his collected "Wissenschaftliche Abhandlungen" (3 vols., 1909, Barth), through the co-operation of the Academies of Berlin, Göttingen, Leipzig, Munich, and Vienna. But he was distinguished also as a teacher, and his power of exposition is shown in several volumes of lectures which have appeared in print. Perhaps the best of these are his "Vorlesungen über Gastheorie" (2 vols., 1895), based chiefly on Maxwell's and his own fundamental researches on the subject. Less well known are his lectures on Maxwell's theory of electricity and light, and those on the principles of mechanics, each occupying two volumes.

The book now under review comes from the same Leipzig press, and forms a third and final volume of the lectures on mechanics. Unlike the preceding volumes, it does not come direct from Boltzmann himself; it is written, on the basis of his lectures, by one of his pupils, Buchholz, to whom Boltzmann, and afterwards his widow, allotted the work of editorship. It first appeared in 1916 as an appendix to a larger volume of Boltzmann's lectures, also edited by Buchholz, entitled "Applied Mathematics: the Mechanical Potential and its Application to the Determination of the Figure of the Earth (Higher Geodesy)." It contains the theory of elasticity and hydrodynamics which was a necessary adjunct to the geodetic part of that treatise; but its separate publication as a third volume of the principles of mechanics fulfils Boltzmann's intentions regarding the latter course of lectures, and renders it readily available to those who do not wish to study the larger work from which it is reprinted.

Boltzmann's lectures on mathematical physics formed a "cycle" unified by his use of the conception of the potential—the mechanical, electrical, and electrodynamic potentials, as in the lectures previously published, and, in the present volume, the elastic and hydrodynamic potentials. One further set of lectures remains unpublished—namely, that on the general mechanical theory of heat; in this course the thermodynamic potential is introduced and illustrated by three important examples of its application, of which Gibbs's theory of chemical equilibrium is the chief. This final instalment is at present held up owing to financial difficulties; it is much to be hoped that these may be overcome, in order to complete Boltzmann's representation of mathematical physics and in view especially of the close relation of these lectures to his work on gas theory.

Although beyond a certain point the theories of elasticity and hydrodynamics diverge widely, their kinematical foundations are almost identical, while the theory of the stress ellipsoid is as necessary to hydrodynamics as it is to elasticity when the viscosity of liquids is taken into account (though in the present volume the latter is not done). It is therefore illuminating to consider the two subjects together, and their treatment in these lectures is admirable. The explanations of the kinematical and mechanical principles are simple and detailed, and the elastic potential is then introduced and applied to a few important general problems—in particular, to the proof of the Hamiltonian principle for elastic potential energy, to the determination of the potential for various forms of crystal, and to the propagation of waves of compression and distortion in an elastic solid. This is all done in comparatively little compass—a hundred pages—and a general grasp of the subject is rendered easy by the avoidance of individual problems, such as the theory of bending in beams, or the vibrations of rods, strings, and membranes, in which the potential plays no prominent part.

The second hundred pages are devoted, on similar lines, to the general equations of hydrodynamics, the velocity potential, and the theory

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